AD-A154 416 COMPUTER CENTER POLICY(U) DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD G R GRAY MAR 85 DTNSRDC/TM-18-85-03 1/1

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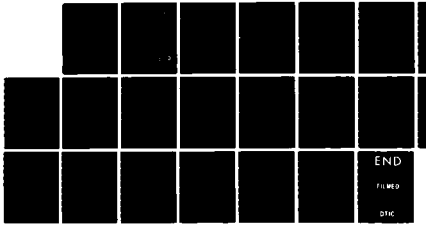

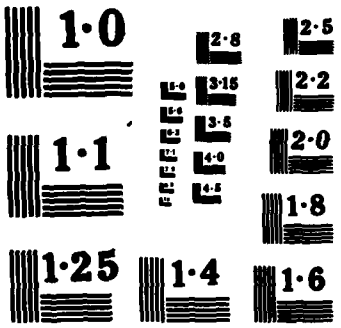
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TM-18-85-03

DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

Bethesda, Maryland 20084

AD-A154 416

COMPUTER CENTER POLICY

by

Gilbert R. Gray

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Computation, Mathematics and Logistics Department

Technical Memorandum

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COMPUTER CENTER POLICY

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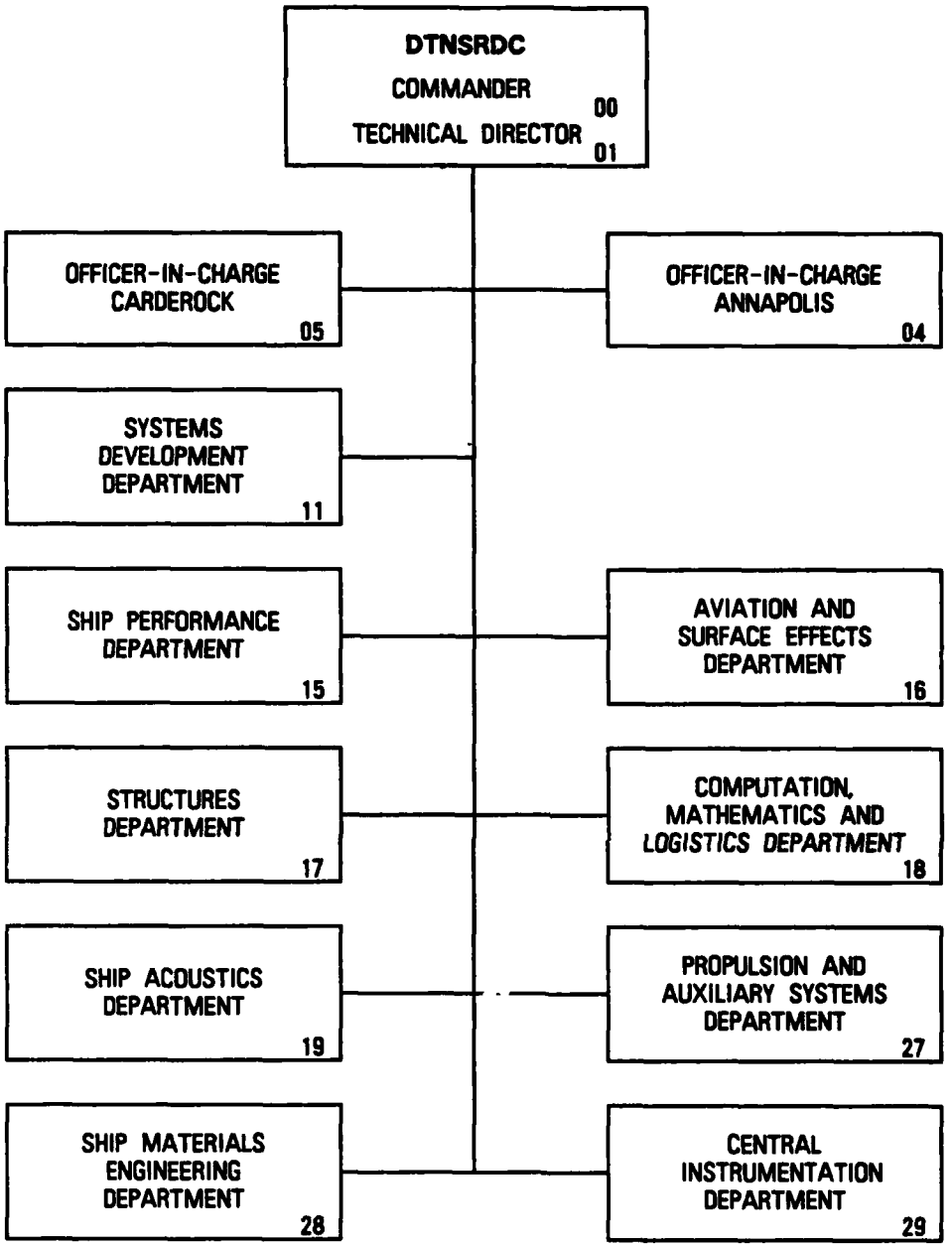

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REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: TM-18-85-03	2. GOVT ACCESSION NO.: AD-A154 416
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): Computer Center Policy	5. TYPE OF REPORT & PERIOD COVERED: Technical Memorandum
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): Gilbert R. Gray	8. CONTRACT OR GRANT NUMBER(s):
9. PERFORMING ORGANIZATION NAME AND ADDRESS: David W. Taylor Naval Ship R&D Center Bethesda, Maryland 20084-5000	10. PROGRAM ELEMENT,PROJECT,TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: Computation, Mathematics & Logistics Dept. (18) Computer Facilities Division (189)	12. REPORT DATE: March 1985
	13. NUMBER OF PAGES: 29
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS.(of this report): Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)

Approved for Public Release; Distribution Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20,if different from Report)

18. SUPPLEMENTARY NOTES

Accession For
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Unannounced [ ]
Justification
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Availability Codes
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Computer Services
Computer Time
Computer Center
CDC CYBER Computer
Computer Charges
Policies
Procedures
User Services
Software
Computer Users
DEC VAX Computer

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The purpose of this document is to provide computer users with a brief statement of policies, procedures and charges by which the general purpose computer center at the David W. Taylor Naval Ship Research and Development Center is governed.

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S/N 0102-LF-014-6601

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Exhibit A - Request for Emergency Service

1. INTRODUCTION

This document briefly describes the general policies and procedures governing the use of computer and related resources at the David W. Taylor Naval Ship Research and Development Center (DTNSRDC) general purpose Computer Center. The overall policy is to make automatic scientific computer services available to users to the fullest extent and with the greatest flexibility possible under the existing federal and Navy regulations. Updates and changes to these policies and procedures, which undergo continual review, will be made and disseminated as appropriate. The Computer Facilities Division (Code 189) and the computers and related resources under its control are referred to herein as the Computer Center.

General Computer Center (CC) policy also includes the following:

. The CC operates strictly as an open shop, i.e., all user programming is handled by the user with training and consultation available from the CC.

. The CC operates on a pay-as-you-go and fully reimbursable basis, i.e., prior to the availability of CC resources to any user, that user or his sponsor must have established an account with sufficient funds with the DTNSRDC Comptroller Department.

. Based on the priority selected by the user (for each run), all users are treated equally.

. Commercial resources within the CC are procured on a competitive basis, i.e., single source procurements are held to a minimum.

2. BACKGROUND

2.1 DTNSRDC Mission

DTNSRDC is the principal Navy RDT&E Center for naval vehicles and logistics. The overall mission of DTNSRDC is to conduct a program of analysis, research, development, test, evaluation, systems integration, and fleet engineering support in naval ship systems and to conduct investigations into related fields of science and technology. Some of the areas of effort include research and development (in laboratory environments) in hydromechanics, aerodynamics, structural mechanics, acoustics and vibration, marine engineering, ship propulsion, applied mathematics, logistics, materials and computer sciences as related to the design, construction, maintenance and operation of naval ships, their aircraft and weapon systems.

2.2 DTNSRDC Special R&D Facilities

To meet its mission requirements, DTNSRDC has several facilities, many of which are unique. These facilities include Deep, Shallow, High-Speed, Small, Maneuvering-Seakeeping and Rotating-Arm water basins, as well as variable pressure water tunnels and a circulating water channel plus subsonic, transonic, supersonic and hypersonic wind tunnel facilities. A number of specially outfitted vehicles are also included among these facilities. They are used to study, test and analyze phenomena related to underwater explosions, shock damage, underwater noise radiation, etc. Additional facilities include a Ship Shock Simulator, Anechoic Flow Chamber, Million Pound Hydraulic Axial Loading Fatigue Machine, Metal Research Facility, Machinery Test Facility, Ship Motion Simulator Facility and the Computer Center.

2.3 Computer Center Mission

At DTNSRDC, computers and computer technology are an integral and requisite part of special research facilities and the research process. A variety of computing equipment is used and is needed at DTNSRDC. Some of these computers (hardware and software) are part of the research facilities, while others are general-purpose in nature, but are integral tools to specific research projects and/or facilities.

The mission of the CC at DTNSRDC is threefold. First, it is responsible for servicing the scientific and engineering computational requirements of DTNSRDC. Second, it serves as a major computer science and computation center for the Naval Sea Systems Command and the Naval Air Systems Command. Finally, it serves the scientific and engineering computing requirements of the systems commands in the National Capital Region.

3. COMPUTER CENTER RESOURCES

Essentially, CC resources consist of three major elements: hardware, software and personnel. Other factors related to these resources are contracting, site preparation, and other such facilities which are available to the CC from other DTNSRDC departments.

3.1 Hardware

Hardware configurations at the CC are dynamic in that they undergo several significant changes each year in an effort to stay abreast of DTNSRDC requirements. For example, during FY84, DTNSRDC released four major mainframes and installed two with power exceeding the combined power of those released.

At present, the CC has two major CDC CYBERs plus a Mass Storage System (MSS) which links them together with each other and is connected to DTNSRDC's office automation central computers (DEC VAX's). These links are provided via hyperchannels and satellite couplers. Hence the MSS provides a means for file sharing, file transfer and queue transfer. The CC also has clustered VAX's which are DECneted to each other and other VAX's. These VAX's are used in a distributed manner with DEC PRO 350 personal computers and with the CDC CYBERs.

The linked CYBER systems, VAX's and MSS are also directly or indirectly networked to MILNET (formerly ARPANET). In addition to the clustered and office automation VAX's, other VAX's are used to:

(1) connect one CYBER system to the Navy Laboratory Computer Network (NALCON)
(2) develop and maintain standard software for NALCON
(3) operate the Navy Electronic Mail Service (NEMS) via MILNET.

The current local area networks (LAN) and the links to MILNET will be further expanded in the future when DTNSRDC develops and installs base-wide LAN's at its Carderock and Annapolis sites.

Related off-line peripheral equipment includes CALCOMP plotters, Datagraphix Computer Output Microfiche (COM), Xerox 8700 printer, and numerous remote batch, interactive and active graphics terminals.

3.2 Software

A wide variety of computer software is available for use with the computers and the related peripheral equipment. Software (S/W) has been obtained from the hardware manufacturers, the user community, software vendors, cooperating user groups and the CC staff. In varying degrees, each of these sources of acquisition has provided software in the following general categories:

- Operating System's S/W (NOS/BE, NOS, UNIX, VMS, etc.)
- General Compilers (FORTRAN, COBOL, C, etc.)

- Utility Routines (file copies, etc.)
- Library Subroutines (mathematical functions, IMSL, etc.)
- Special Compilers/Languages (APL, APT, PASCAL, etc.)
- Systems Level Application S/W (NASTRAN, ABAQUS etc.)
- Data Base Management Systems (System 2000, RIM, DATATRIEVE)
- Graphics S/W (Calcomp, DISSPLA, Plot 10, etc.)
- Simulation S/W (GPSS, SIMSCRIPT, etc.)

Combinations of the above S/W with users' programs can be processed concurrently as local and remote batch, conversational and active graphics jobs under the operating systems.

3.3 Computer Center Personnel

The Computer Center staff consists of professional men and women trained and experienced in systems analysis, programming, engineering, computer operations, ADP consultation, applied mathematics, and administration. Staff personnel are committed to the goal of providing effective computer services. As required and in accordance with Navy policies and procedures, contract personnel (such as for hardware maintenance) may be utilized to furnish services. In these cases, quality of personnel and cost-effectiveness of the services are primary selection factors. The personnel of the CC staff have the following responsibilities.

Advanced Planning

- Develop advanced plans for future systems.
- Develop and implement "state-of-the-art" models for currently installed systems.

Business and Administration

- Develop and justify the CC budget.
- Perform all CC business and accounting functions including such items as user accounts, CC charges, maintenance of auditable records, monitoring CC income vs. expenses, etc.
- Develop and maintain a program of performance monitoring and evaluation of utilization parameters affecting users directly (i.e., wait time, turnaround, etc.).

User Services

- Provide training and consultation in OS's and languages to users on a group or individual basis.
- Provide user documentation on CC systems.
- Validate S/W prior to making it available to the general user.
- Provide and maintain the system of library subroutines.

System Software

- Develop, install and maintain (as appropriate) the systems level software for the CC's computers.
- Develop and maintain a program of software monitoring and evaluation to direct present and future CC improvement plans.
- Initiate programs of development and experimentation to resolve technical problems of the CC.

Hardware / Engineering

- Plan and implement CC facilities.
- Maintain and/or coordinate the maintenance of the CC's equipment.
- Obtain the necessary ADP approvals for new or modified ADP facilities.

Hardware / Communications

- Manage the planning and maintenance of communications equipment.

Hardware / Operations

- Operate CC equipment.
- Maintain CC media library.
- Maintain local user terminal and keypunch rooms.
- Process off-line peripheral input/output requirements.
- Provide the CC with the required and necessary ADP security coordination.

4. AUTHORIZATION FOR NEW USERS

4.1 General Prerequisites

There are four general prerequisites which each user must meet. First, new users require an authorized (approved and certified by the DTNSRDC Comptroller) job order number which establishes the availability of funds. Next, general user information, such as name, organization, mailing address, computer access number, private passwords, etc. have to be established to help ensure easy communication between the user and the CC. Then, the overall nature and volume of the user's workload (but not necessarily its contents) must be given so that requirements on the computer facility resources may be estimated. Finally, the user must possess a sufficient knowledge (gained through prior experience or via CC training) of the computer facility he/she intends to use. In the case of contractor users, (1) the Government contract being worked on must be established and (2) a standard DTNSRDC Indemnity Agreement must be executed.

4.2 Initial Contacts

Requests for services are handled on as informal a basis as possible. Users with established job order numbers working on projects which normally use the computers, may make direct contacts with the Business Office and then User Services or, in the case of local batch, the ADP Control Center during all phases of establishing and accomplishing work requests for computer time and services.

New non-DTNSRDC users must ultimately contact the Business Office to establish a computer account, although initially they may contact User Services to become familiar with the CC and its services and to evaluate the ability of the CC to meet their needs.

4.3 New Computer Resources

If, after initial contact with the CC, it is determined that new computer resources (including terminals and communications) are needed to meet requirements, then the Hardware / Engineering Branch must obtain authority to proceed with rendering the new services. This generally means (1) the DTNSRDC ADP Policy Official must agree and seek appropriate ADP approvals, (2) the necessary funds must be made available, and (3) the plans for procurement and installation must be made and implemented.

As a general policy, the CC provides technical assistance in planning for the installation of compatible terminal equipment and communication facilities for all remote users. User organizations must provide funds for terminals and associated communications at the time of the request for installation.

5. TRAINING

For the purpose of ensuring the effective and efficient use of DTNSRDC computer facilities, the CC maintains the capability to train and orient large numbers of computer operations and user personnel.

Training responsibilities are shared by the appropriate vendor and the CC. The CC (User Services in particular) is charged with management and policy responsibility for training. Experienced and cooperating users may also perform some teaching and other training functions.

For general user training, the user organizations are responsible for such costs as salaries for the time spent in classes, travel, workshops, etc. Users will be charged for any training cost accrued by the CC such as for special software systems, operator, hardware maintenance, and engineering interface courses. Whenever there are commercial costs (such as for manuals, vendor teachers, etc.) related to training, those costs are passed on to the users.

Courses given or sponsored by the CC include:

. Introduction to Computers	(4 days)
. Introduction to FORTRAN	(8 days)
. Introduction to the Operating System	(3-6 days)
. Introduction to Computer Graphics	(3 days)
. Introduction to COBOL	(5 days)
. Introduction to System 2000	(5 days)
. Special Topics (such as editors)	(1 day)
. Advanced Courses (as appropriate)	

6. CONVERSION

The CC will aid users in converting their programs to the computer systems installed at DTNSRDC. Appropriate training courses, consultation, conversion software aids and special literature are offered by the CC.

In general, the cost of conversion, including machine time, will be borne by the user.

7. USER GUIDELINES

7.1 ADP Standards

As a general policy, the DTNSRDC CC supports the overall Federal policy of fostering good ADP standards. Therefore, wherever feasible, for the hardware/software configuration installed in the CC, the applicable federal standards apply and are encouraged. The dynamics in the computer world, the difficulties of establishing standards, and the absence of established standards in many areas, all make it impossible for an installation to cite and abide by standards in many cases.

As an Open Shop facility, adherence to applicable standards is most frequently a matter for individual users and their sponsors. The CC tries to make it possible for users to follow standards by having appropriate resources.

7.2 Programming Languages

Portability of software is an important aspect of all large programming systems because it determines the extent to which the system will be readily available to a large segment of users and the cost (or additional cost) involved in making it available. Programming efforts which result in programs with a long life cycle and with potential popularity or usefulness among a set of users, should keep portability in mind from the beginning. Key parameters include programming language, minimum configuration (such as memory size, storage volume, etc.), mode of operation (batch, interactive or both), relationship of the program with the operating system, efficiency of the code, proper documentation, etc.

Navy guidance has long stated that FORTRAN and COBOL are the languages to be used for most applications. These languages are available on CC major computing equipment. The intent of this policy is to help increase the portability of most programming systems, thus minimizing the costs of conversions. Navy guidance also allows programming in other high level languages when justified. In the near future, Ada is expected to become a favored Navy language.

Programs written in assembly or machine languages are especially expensive to convert to a different computer and hence should not be used in applications programming. A knowledge of assembly languages, however, is essential to systems programmers who maintain the operating system, and develop certain library and utility routines and is useful to applications programmers who must write and debug routines in higher level languages controlled and/or monitored by the operating system.

No individual user (or his/her sponsor) can be allowed to program in such a manner (generally using assembly language) as to affect directly (or have a high potential of affecting directly) the process of other users' jobs. For example, on the CDC Systems, no individual user can code for the peripheral processsors (PPs).

7.3 System Level Software Development

Before system level software is developed for use on CC facilities, approval must be obtained from the CC. If approved, the responsibility for the accuracy, maintenance, reliability, and documentation of such software must be established. The developer or user of non-CC-supported software must assume complete responsibility for these items. Failure of such software will not be sufficient grounds for the CC to make refunds.

It is imperative that all developers of system software follow the guidelines below, which are designed to avoid jeopardizing the software maintenance agreement specified in vendor contracts. Also, these guidelines are intended to facilitate installation of the software and to insure that normal accounting procedures will apply to applications using this software.

(1) All programs which use non-CC-supported system software must operate as a normal application under the computer facilities standard operating system.

(2) Non-CC-supported system software must be able to coexist with all CC-supported system software.

(3) Non-CC-supported system software must use standard facilities and procedures for interfacing with CC-supported system software.

(4) Non-CC-supported system software must be able to operate without any modifications to CC-supported system software.

(5) Non-CC-supported software must be appropriately documented.

7.4 Software Packages

On its various systems, the CC provides a variety of software packages for users. Many of these are commercial and proprietary, some are locally developed, and others are provided by users themselves for all to take advantage of. The CC does not take responsibility for these packages with regard to refunds, availability, training, consultation, etc. The CC does take responsibility for the packages developed by CC personnel and packages paid for by CC funds from commercial sources. Packages provided by users (or for that matter any user-developed software), which have an adverse impact on the operating systems (i.e., causing the system to malfunction) or other users in general, will not be allowed to run.

7.5 Central Memory

In any computer system (whether virtual or not), central memory (CM) is a key resource which has a significant impact individually on the progress of jobs and cumulatively on the "workload". No matter how fast the processor (CPU) or how efficient the programming code, without balanced CM, computer system effectiveness suffers. Each user should make every attempt to minimize the memory requirement in his/her programs. This effort should reduce the cost, improve job turnaround and increase the overall effectiveness by which the computer processes the entire workload. Also, as indicated later, the smaller the CM requirements for a job, the greater its chances for being selected for processing "next".

7.6 Data Storage

Data storage is provided in several categories. These include on-line disk files (permanent files), on-line mass store files, off-line tape files and "off-station" critical file storage. These storage facilities are important factors in determining cost, reliability, security, efficiency, and convenience. Unlike central memory, general data storage is available in the billions of characters. However, like central memory, this storage has direct impact on user jobs with respect to turnaround time, response time, workload throughput, cost, and priorities. In other words, excessive use of storage and/or the misuse of storage (*i.e.*, use of permanent file disk space for long term archival storage instead of MSS or tapes) should be avoided since this increases user costs and decreases computer systems effectiveness.

Disk storage is available for user system files, including permanent and scratch files. Disk storage is also required by the operating system and other systems level files (i.e. compilers, DBMS, etc.). Generally, users should plan to utilize permanent files for frequently accessed data and programs (while maintaining a back-up copy on tapes or the MSS for themselves, as appropriate). The user should protect his/her permanent files by utilizing passwords or access controls, which can be applied at several levels. Once a permanent file is created, it should be accessed to check its validity. Periodic checks of a file's integrity are strongly urged, since occasionally a file may be partially destroyed.

There are three methods by which permanent files are backed up. First, on all major computer systems, the CC periodically dumps and saves files. For the most part tapes are used. Second, files may be created on the MSS and the backup of that file will be maintained in a special family in a separate portion of the MSS. Finally, for extremely critical and important files, the user may indicate such files which will then be copied to tape and stored away from the CC in case of an emergency at the Center. In all cases (depending on the criticality of the file, the project, sponsor requirements, etc.), it is the responsibility of the user to maintain the capability to recreate his essential files, since (a) an occasional lost file may not

be recoverable and (h) the Computer Center will not be able to refund users for long processing runs required to recreate files. User Services personnel will restore files saved on the back-up media or the user's copy when possible.

Permanent files will be provided an account number (or job order number) and expiration date by the user. The account number will be the basis for charging the user for the storage space. The expiration date will not generally be used as a basis to purge the file(s), but rather as a reminder to the user. The default expiration date is 30 days after creation. Files whose account numbers become invalid are purged. In fact, the CC reserves the right to purge permanent files for any of the following reasons:

(a) Invalid account number
(b) Invalid user ID
(c) No access within the last 30 days
(not applicable for MSS files)
(d) Known errors (such as parity) which adversely affect the computer system when the file is read.

Files which are purged will be kept on tape for a period up to one month. User Services personnel will honor requests to restore purged files after the problem areas(s) have been resolved. There is a fee for this service.

Tape storage is also available at the Computer Center. With some exceptions, tapes should have internal labels. For more reliable operations, tapes should be read and rewound at least every few months to adjust tension and control dust accumulation. Also, tapes should be stored in a humidity/temperature controlled environment and in an upright position enclosed in a proper container.

Basically tapes are treated as computer room (Diebold), slot or system tapes. Computer room tapes belong to users but are never touched by users. Computer room tapes are assigned to specific users by the Computer Center via an on-line program. These tapes are centrally located and maintained for reliable, ready use on the computer. Slot tapes are under the control of users and are presented to the CC when the related jobs are to be run. Systems tapes are under the control of system software or operations personnel, and contain data and programs involving the operating system and related software. Space for computer room tapes is limited and must be reserved for active tapes only.

Generally, labels should be used on all tapes. When internal (computer readable) labels are not used, the computer user must take responsibility for lost time associated with reading or writing incorrect tapes. However, tapes which are to interface with some peripheral equipment might not allow labels.

As a general rule, tapes cannot be utilized by users on interactive systems which are run without the full-time attendance of an operator. On these systems, tapes are used to back-up files and load the systems.

7.7 Non-DTNSRDC Resources

DTNSRDC users often have need for resources not available in-house. Other Navy Laboratory, other government and contractor ADP resources are or can be made available. In general, the DTNSRDC CC has agreements with Navy Laboratories, other government computer centers and some contractors for computer time and software services.

The Navy Laboratory Computer Network (NALCON), with host computers at each CNM laboratory center, is operational at DTNSRDC. NALCON publishes the list of host computers and software available. Other services are provided via NALCON (such as electronic mail) and a list of these is also published by NALCON.

The overall approval and processing responsibility for obtaining non-DTNSRDC resources comes under the jurisdiction of the ADP Policy Office.

7.8 Official Use

As is tha case with all government equipment, CC resources are to be used only for official government work and are not for personal use.

8. SECURITY

8.1 Access To Computer Areas (Physical Security)

Users are not given access to computer rooms and the equipment therein. Entrance to these areas is controlled by locked doors and operators on duty.

Physical security is also maintained by DTNSRDC security forces and their devices around-the-clock. Appropriate alarms are utilized to alert both the security forces and the fire departments when they are needed under emergency conditions. Automatic detection devices are utilized by the engineering and operations staff to give the earliest possible warning of environmental problems.

8.2 Access To Computer Resources (Access Numbers and Passwords)

Access to DTNSRDC computer resources is limited to government users and a few contractors with appropriate government contracts. All users must have valid DTNSRDC accounts (job order numbers) as issued by the comptroller. Project leaders with verified job order numbers are issued computer access numbers by the Business Office. Computer access numbers and passwords should be given only to personnel working on the project with instructions not to disseminate further. The project leader can limit the use of the computer access numbers to specific users (ID's) by notifying the Business Office. In addition to the computer access number, interactive access to the computer is protected further by special passwords which the project leader or user must devise and can change at will. Access to permanent files is also controlled and protected via the use of passwords and access controls which offer several levels (read, control, etc.) of protection or by group designations which are worked out with project teams. The operating system provides automatic protection in such areas as conflicting use of memory.

8.3 Classified Processing

Classified computer jobs can be entered into the computer systems at the central site via the ADP Control Centers only (not from remote terminals). All such jobs, which must be clearly marked as to classification in accordance with the latest DTNSRDC Security Manual, will be run separately from other jobs at times when the central system cannot be accessed remotely. To maintain the highest level of overall throughput and turnaround time, classified jobs may be run overnight. The following items must be followed during the processing of classified files.

1. All classified production runs are handled as described in the appropriate DOD security manual for classified information.

2. Computers are available for classified runs daily (Monday through Friday) during times when remote terminals are not connected.

3. Input Data.

a. Cards - The degree of classification must be indicated on the first and last card of each deck submitted at the ADP Control Center for processing. A deck so marked must be handled as one document. Cards removed from a classified deck for separate processing or use must be marked as a separate deck.

b. Tapes and Disks - Tapes and Disks must bear external markings and internal notations sufficient to assure that the recipient of tapes, disks, or classified information contained therein when reproduced by any medium, will know that classified information of a special level is involved.

4. Output Data. All printed and plotted outputs must indicate appropriate degree of classification as described in the security manual. All other media (such as tapes, disks, etc.) on which classified output will be written, must be submitted with the degree of classification of expected output indicated.

5. The System Security Officer, the CC focal point for system security, is located in the Hardware/Operations Branch.

6. The normal permanent file system and the MSS cannot be used for storage of classified data or information.

8.4 Privacy Processing

Since the DTNSRDC Computer Center is primarily a scientific and engineering shop, relatively little "privacy" data is involved in its daily ADP processing. Even so, provisions are made for the user to declare his/her data private for appropriate treatment and protection while under the CC's custodianship. CC staff and contractor personnel are fully briefed as to their responsibility under the Privacy Act.

8.5 Back-Up

Computer time, program and data file back-up are important for any computer center. At DTNSRDC, appropriate computer time back-up agreements are always sought. In the case of the CDC systems, back-up exists, first of all, between the several computer systems which can be operated separately under the same basic software systems. Next, there is an agreement for mutual back-up between DTNSRDC and other government activities with several CDC computers installed. Finally, commercial back-up exists in several locations in the United States. In each of these cases, the DTNSRDC operating system would be generated on the emergency host system. Program and permanent file back-ups are maintained at DTNSRDC. Tape back-up is the responsibility of the user. As appropriate, the CC will assist in tape back-up.

The DEC computers are backed up in a similar manner.

8.6 Terminal Security Officer

Navy ADP security regulations require that all terminals, personal computers and other micros have "ADP security officers". In the case of users of the CC, the individual user is designated as the security officer for his/her equipment.

9. ACCOUNTING

9.1 General Accounting Policies and Procedures

Computer facilities are used as integral tools in the research and development projects which in turn fund computer operations. The CC is required to operate on a pay-as-you-go basis. Computer rates are determined on a pro rata basis to recover the costs of equipment rentals, personnel salaries, maintenance, supplies, communications, training, manuals, pick-up and delivery services, etc., incurred in the operation of ADP facilities. In general, the users of each facility pay the costs for the use and availability of that facility. These same general principles hold whether the ADP facility is available in-house, by contract, or from other Government agencies. The final responsibility for setting computer rates lies with the DTNSRDC Comptroller.

The general accounting procedures are designed to recover operating costs equitably and to supply accurate utilization data as required by the Navy's ADP reporting system and the DTNSRDC accounting system.

9.2 Factors In Accounting

The primary factors in accounting are listed below. These factors are included in the charge algorithms and procedures. Records kept on each job run on the computer generally show the jobs' utilization of these factors.

(1) Central Processor Time
(2) Central Memory
(3) Input/Output Facilities
(4) User Data and Program Storage
(5) Communication Facilities
(6) Category of Service (Priority)
(7) Special (Non-Standard) Handling
(8) System Overhead
(9) Connect Time
(10) Related Supplies
(11) Input/Output Processor Time
(12) Data Transfer Volume
(13) Temporary Storage Usage

9.3 Resources For Accounting

Resources for performing the accounting functions fall into two general groups. First, the operating system furnishes basic accounting data (such as CPU time, I/O time, connect time) for each job run. Second, the CC develops, maintains, and processes accounting programs which monitor project usage and post charges accordingly.

9.4 Categories of Service

The assignment of categories of service has a two-fold purpose. First, category assignments identify levels of services which, if balanced, both satisfy the users' workload requirements and tend to optimize overall system throughput and turnaround time. Second, category assignments offer a means by which users may be charged their fair share of costs in accordance with their usage. The prime elements used in category assignment are the "basis for accounting" items above.

9.5 Accounting Information

With each use of the computer system, the user is required to give both his user code and access number (or job order number). Generally, for each account number there will be an individual or project leader responsible for managing the project funds. Each project leader is encouraged to exercise his option to designate users authorized to use his access number on the CDC systems. When the project leader exercises this option, the CC will control the users' access to the access number.

Users may obtain their own accounting data and information for all CC computers by using available on-line computer programs on the CDC CYBERs.

9.6 Performance and Utilization Evaluation

The primary reason for ADP accounting is to recover operating costs from the users in proportion to their use. Another important output from accounting at DTNSRDC is the analysis of computer performance and utilization. For this reason, accounting-type data collected is not limited to informational units concerned only with charges. Analysis programs have been developed and are maintained and updated as appropriate to measure and monitor such items as:

- Adherence To Standards
- Turnaround Time Analysis
- Wait-Time Analysis
- Communication Lines and Ports Loading
- Priority Utilization
- Resource (CPU, Memory, etc.) Utilization
- Utilization Profiles By Shift, Priority, User Class, etc.
- Workload Pattern Changes
- Effects of Configuration Changes

10. SPECIAL TOPICS

10.1 DTNSRDC ADP Policy Official

To guarantee that all components of DTNSRDC observe appropriate government ADP policies and procedures and that DTNSRDC maintains and effectively uses adequate ADP facilities, the Office of the ADP Policy Official has been set up to guide all DTNSRDC ADP activities including those of the users and CC managers. By DTNSRDC Instruction, the ADP Policy Official (004) is the Head, Computation, Mathematics and Logistics Department (CMLD) and he/she is assisted by a Deputy in Code 004.1.

10.2 Computer Users Forum

To help maintain and improve communications between the major users and the CC, the Computer Users Forum has been established. Members of the Users Forum, rather than representing themselves as individuals, represent their parent organization and its user community.

10.3 Requests For Emergency Services

Limits for the different normal categories of service can be overridden by higher authority to meet emergency requirements on an individual case basis, provided the effect on the total computer system is limited to temporarily reduced response and turnaround. Suspension of services to all other users will not be permitted. The cost of such emergency processing will be significantly higher than for other processing. A signed statement, as shown in Exhibit A, will be required with each request for emergency time. At off-station sites, the written statement must be in the hands of authorized representatives prior to submittal of work and mailed to Carderock as soon as possible.

These procedures have been designed to optimize service for the majority of users. Users should specify lower categories of service for jobs as much as possible, so that the higher categories do not become overcrowded. The system will then be able to give faster turnaround when it is really needed.

10.4 Lost Time Credits

The primary software packages offered have checkpoint/restart provisions designed to minimize lost time and extra costs resulting from machine and software failure. User Services will assist users in determining the best plan for checkpoints for each application. Suspected hardware or software malfunctions should be reported via the User Trouble Form to User Services, whether or not a lost time claim is involved. All claims for refund must be reported within five (5) working days. Credit is given for up to one hour of lost time, i.e., 3600 system seconds or 60 wall clock minutes, whichever is appropriate (to be decided by the CC). Such credit will generally be in the form of no charge for the rerun of the lost job, therefore, claims usually should be made before the job is rerun.

To minimize overall operational costs, refunds for less than five dollars are not made. Lost time credit for jobs in a dependency stream will be limited to credit for the job that failed. There will be no refund or free time for recreating a file when it is purged before the job using it has been successfully run and printed. Claims for refunds will not be honored if unaccompanied by copies of the user's Dayfile or Log and full dump (when taken). Refunds or free time will not be given for bad tapes or disk packs which are not under the physical custodianship of the CC. The CC will be the final judge on all lost time questions including whether a refund or no-charge rerun will be granted. Users who do not use standard labels must take responsibility for lost time associated with reading or writing wrong tape files.

This policy applies, in general, for distributed processing when errors at "one level" cause errors at other levels. Refunds will not be made for losses associated with problems created at the personal computer or micro level.

11. COMPUTER CHARGES FOR CDC

11.1 General

As mentioned earlier, the costs of operating and maintaining the computer facilities are borne by the users by way of charges for computer utilization. Computer charges are based on such items as CPU time and memory used plus additional charges for such items as tape handling and storage. Computer rates are established by the Comptroller and are stabilized for a given fiscal year. Each fiscal year, rate tables are published for all computer charges. The basic charge formula at DTNSRDC for CDC is:

Cost = (Core Factor) x (System Seconds) x (Category Rate) + (Excess I/O) x (I/O Rate) + Additional Costs

where core factor, system seconds, category (or priority) rate, excess I/O are as defined in the following sections and additional costs are for surcharge, cards read, cards punched, lines printed, tape mounts, disk mounts, connect time, etc. The excess I/O term generally has little or no impact on typical or average jobs.

11.2 Core Factor

The various computers at DTNSRDC have different amounts of central memory available for the user and the system itself. The core factor is applied to each job and is a measure of the portion of memory used by the job. The Core Factor is:

$$\text{Core Factor} = 1 + \frac{M^*}{M}$$

where M^* = Average Weighted Core (AWC)
M = Memory made available to all users

This Core Factor is valid for both virtual and non-virtual systems.

11.2.1 Average Weighted Core

Since field lengths change during the processing of jobs, charges for core are based on the Average Weighted Core (M*) used. The AWC is generally determined as follows:

$$M^* = \frac{\sum_{i=1}^{n} S_i M_i}{\sum_{i=1}^{n} S_i}$$

where n = total number of field length changes

S_i = (CPU + I/O) seconds used during the i^{th} field length

M_i = Amount of core of the i^{th} field length

11.3 System Seconds

System seconds (SS) are determined as follows:

SS = W + X + P_1 Y + P_2 Z, where

W = CPU Seconds from Processor A
X = CPU Seconds from Processor B (where applicable)
Y = I/O Seconds
Z = I/O processor seconds (where applicable)
P_1 = Portion of I/O time charged
P_2 = Portion of PPU time charged (where applicable)

11.4 Category of Service or Priority

Several categories of service are recognized for all CC facilities. Actual rates depend on the category of service and the specific computer system. Rate schedules are published each fiscal year and are also available on-line for the user to study. The general categories of service are listed below with the code most often used:

Code	Category of Service
0	Block time (Weekend)
1,2	Deferred or overnight
3	Regular Prime Shift Batch
4	Express Prime Shift Batch
6	Emergency Priority Processing

The actual memory, time limit, etc., boundaries for the jobs in each category for each computer system is also published each fiscal year.

11.5 Excess I/O

Compared to their CPU utilization a few jobs require a surfeit of I/O Processor, I/O and wall clock time. Since these jobs frequently have large memory requirements, they generally run alone. It is the purpose of the Excess I/O term to avoid charging these jobs the full rate for all of the input/output activity, but, at the same time to charge them a fair rate for resources allotted. The Excess I/O term is:

$$[(1 - P_1)\ (Y)\ (K_1) + (1 - P_2)\ (Z)\ (K_2)], \text{ where}$$

P_1, P_2, Y and Z are the same as defined in section 11.4 and K_1 and K_2 are the excess I/O rates.

11.6 Special Accounting Topics

. Priority Default. The resources indicated as required to run a batch job (on the job card) determine the highest possible run priority. The user actually requests a specific run priority of his/her batch job. In general, the batch priority default is the category defined as "regular prime shift".

. Non-Prime Shift Charges. Batch jobs with priority less than or equal to category 4 (Express Prime Shift) which have not started processing by 1800 (which ends the prime shift) will be charged at the overnight or deferred rate regardless of the priority on the job card. This feature does not apply to any interactive or conversational runs.

. Account Protecting. The user plays an important part in the protection of his/her account. Options that the user has to change and make passwords (or turnkeys) for security should be taken. The user should protect interactive terminals when they are connected and active under his/her account and should give sufficient protection to batch job and charge cards while such cards are in storage or being created.

. Accounting Reports. Official accounting reports are provided to users and their organizations by the DTNSRDC Comptroller Department. Accounting reports by the CC (which are to be considered unofficial as far as accounting for activity funds are concerned) provide the user and his/her organization with detailed information on resources used and the charges provided to the DTNSRDC Comptroller by the CC.

. Annual Rates. Generally, computer rates are set annually. For this reason, the actual rates are published separately from this document.

11.7 Block Time

Block Time is computer time and associated printer time requested by the user and scheduled by the CC Operations Branch for weekend and third shift processing. It is intended for long-running, processor-bound jobs. Block time is scheduled on the following basis:

. Generally this schedule is on a first-come, first-served basis. Block time usage may require most of the available central memory and all of the available computer resources of one kind or another (such as tape drives). The CC reserves the right to utilize any unused resources.

. Weekend block time will be scheduled and charged for a minimum of four hours (per day) which may include one user or a combination of users. Third shift block time will be charged for a minimum of 15 minutes (CYBER 176) or 30 minutes (CYBER 750).

. The time scheduling and the hourly rates refer to "wall clock" time. Normal charges for resources (tapes, memory, disks, etc.) do not apply.

. Maximum credit for lost time is one hour, i.e., 3600 system seconds or 60 wall clock minutes, whichever is appropriate (to be decided by the CC). Therefore, user reruns should be in multiples less than one hour. The CC reserves the right to checkpoint or drop jobs which exceed their estimated time by one hour.

. Usage includes on-site or on-call maintenance. If the user requests on-site maintenance during periods when it is not normally scheduled (to help guarantee completion of vital work), an appropriate charge per hour will be applied to cover the additional costs.

12. CHARGES FOR NON-CDC SYSTEMS

Each fiscal year, rate tables are published for all computer charges. A copy may be obtained from the Business Office by calling (202) 227-1361. The rates are also available on-line on the CDC computers.

12.1 DEC VAXcluster

Charges are based directly on resources used, such as CPU time, connect time, tape mounts, pages printed, etc. A discount subscription is available.

12.2 NEMS

The Navy Electronic Mail Service (NEMS) is an unclassified system which, for a pre-paid subscription fee, will provide to the Navy Department and their support personnel an electronic mail service.

12.3 Terminal Charges

When the CC leases terminals to users, their organizational units controlling the terminals must pay for them and the associated communications in one of several ways worked out directly with the CC. In every case, the organization must have sufficient funds posted with the DTNSRDC comptroller. For off-site terminals (non-DTNSRDC locations), the arrangements for installation and communications (at those sites) must be made and implemented by the off-site organization.

12.4 Charges for related peripheral equipment

- Computer Output Microfiche (COM) is charged by the fiche. Additional copies of the fiche are charged at the same rate.
- Xerox-8700 output is charged by the page. Remember that with duplex printing, each side of a sheet of paper is a page.
- Calcomp 1051 and Calcomp 936 plots are charged by the hour and includes setup time.

12.5 Non-DTNSRDC Computers

When the CC arranges for the use of outside computer time (and other resources) the actual user's project must pay for the services rendered (including related CC expenses). As a general rule, users will be charged actual costs plus a surcharge for the use of outside (other government or commercial) ADP services provided via the CC.

EXHIBIT A. REQUEST FOR EMERGENCY SERVICE

Date_____

From:
To: Computer Facilities Division (189)
Via: DTNSRDC ADP Policy Official (18)

Subj: Emergency Computer Requirements

1. Emergency computer requirements exist for the following job under the criteria shown. Emergency processing and rates are authorized for this job, if computer facilities are available.

COMPUTER _____

JOB NAME _____

MAX CORE SIZE _____

TIME LIMIT _____

OUTPUT TYPE(S) _____

OUTPUT VOLUME _____

INPUT TYPE(S) _____

INPUT VOLUME _____

DATE/TIME JOB READY _____

DATE/TIME JOB REQ _____

ESTIMATED "WALL CLOCK" TIME _____

JOB ORDER # _____

_____
Department Head

_____ _____
Code 189 User

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